

Commonwealth of Massachusetts
Department of Telecommunications and Energy
Investigation Into Service Quality Guidelines
Docket No: D.T.E. 04-116
Department Staff's Fourth Set of Information Requests to
All Electric Local Distribution Companies

Request No. DTE-LDC 4-1

Do the current system wide SQ measures permit pockets of poor performance in terms of SAIDI, SAIFI, and CAIDI? If so, explain how such poor performing pockets can be identified, reduced, and eliminated.

Response:

Unitil believes the current reporting requirement addresses pockets of poor performance within its service territory. Unitil's annual SQ reporting includes system level SAIDI, SAIFI and CAIDI as well as a report on poor performing circuits. Poor performing circuits are defined as:

- (i) a circuit that has sustained a circuit SAIDI or SAIFI value for a reporting year that is among the highest (worst) ten percent of that utility's feeders for any two consecutive reporting years; or
- (ii) a circuit that has sustained a circuit SAIDI or SAIFI value for a reporting year that is more than 300 percent greater than the system average of all feeders in any two consecutive reporting years.

Reporting SAIDI, SAIFI, and CAIDI on a system basis provides a high level view of how the system as a whole is performing. Reporting SAIDI, SAIFI, and CAIDI statistics by circuit does provide a more granular view on system reliability. If the Department were to require only the system indices as part of the reporting, it may allow poor performing areas to persist throughout the service territory. However, the poor performing circuit requirement does not allow pockets of poor performance with respect to the system averages.

Unitil's approach to reliability improvement on poor performing pockets of the system consists of researching the worst outages and the worst performing circuits on a routine basis. Trouble report information is analyzed to determine any trends to the causes of outages. Reliability improvement projects are developed and compared to each other based upon dollars per saved customer minute of outage time and dollars per saved customer interruption. The projects chosen have the highest relative benefit to cost ratio. This is consistent with the reporting that is required for the annual SQ filing.

Person Responsible: Kevin Sprague

Date: July 13, 2005

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Request No. DTE-LDC 4-2

Is it feasible for the current SQ measures SAIDI, SAIFI, and CAIDI to be at circuit level instead of at a system-wide level. Will this capture pockets of poor performance? If so, please describe:

- (a) how can such change be undertaken; and
- (b) what would be the advantage and disadvantage to the customers and the distribution companies?

Response:

Unitil described the advantages and disadvantages of reporting reliability indices on a circuit level basis in response DTE-LDC 3-3. Unitil does not believe reporting reliability indices on a circuit level basis will provide clear and concise information that can be used without a high level of system knowledge. Unitil does and will continue to use this type of information as an analytical tool for developing cost effective reliability improvement projects. This data by itself will not identify pockets of poor performance for the following reasons:

1. Each circuit has its own design, customer density, location (rural or urban, trees or not), circuit ties, etc. From this standpoint, circuits cannot be compared with other circuits. Circuits can only be compared to their historical performance and even that comparison is difficult due to the potential for high variability.
2. Circuit configurations change all of the time. Circuit configurations are a good way to maximize system performance from a reliability standpoint while also deferring system improvement projects for loading or voltage concerns. Once the configuration of a circuit changes, the overall performance of the circuit will change and no longer can be compared to the historical performance standard.
3. The reliability indices alone do not provide an accurate picture of the performance of the circuit. For instance, assume that a circuit is serving one customer. Further assume that over the past five years, this circuit has not experienced any outages. Then, this year, the circuit has one, 3-hour outage. This results in a SAIDI of 180 minutes and a SAIFI of 1.0. If this is compared to historical performance, a SAIDI of 180 minutes is very poor when in reality, this customer has experienced rather good reliability. Simply looking at annual reliability indices can be misleading.
4. Most of Unitil's circuits are rural and are exposed to tree contact. Unitil follows a documented vegetation management bulletin which defines the tree trimming cycle based upon voltage class. It is reasonable to believe that circuits which have just been trimmed will have fewer tree related interruptions than circuits that

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have not recently been trimmed. Therefore, over the course of the trimming cycle, reliability may be impacted by the number of years since the last trimming.

5. Annual variability in circuit level reliability performance will make it very difficult to set realistic performance goals. This approach will reduce the flexibility of the utility and will tend to result in projects with a higher average cost per saved customer minute and saved customer interruption basis. It is prone to over-reaction.

Unitil's approach to reliability improvement on poor performing pockets of the system consists of researching the worst outages and the worst performing circuits on a routine basis. Trouble report information is analyzed to determine any trends to the causes of outages. Reliability improvement projects are developed and compared to each other based upon dollars per saved customer minute of outage time and dollars per saved customer interruption. The projects chosen have the highest relative benefit to cost ratio. This is consistent with the reporting that is required for the annual SQ filing.

As indicated above, reviewing reliability performance on a circuit level basis is a good analytical tool that can be used by utilities in conjunction with other system knowledge to develop cost effective system reliability improvement projects. However, the variability from year to year (i.e., weather, circuit configuration, trimming cycle, etc.) can have a major impact on the results. Utilities need to have the flexibility to implement reliability improvement projects that provide the best overall cost to benefit ratio.

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Request No. DTE-LDC 4-3

If the answer to DTE LDC 4-2 is no, please provide an alternative to DTE LDC 4-2 that captures poorly performing circuits.

Response:

In response DTE-LDC 4-2, Unitil indicated that reporting reliability indices on a circuit level basis will not capture pockets of poor performance. It will provide a snapshot of reliability performance over a set period of time. The determination whether the measured performance is good or bad is challenging over such a short period of time.

Unitil supports the poor performing circuit reporting requirement for the annual SQ filing. The current requirement is adequate for identifying pockets of poor performance while minimizing the impact of year over year variability in the data.

The current reporting requirement looks at reliability performance over a two year period. Circuits within the two year period that 1) are the worst ten percent relative performers, or 2) have circuit level reliability indices that are 300 percent greater than the system average of all feeders are reported. The combination of worst performing circuits and 300 percent greater than the system average provide better information about pockets of poor performance than simply reporting the circuit level reliability indices. Unitil recommends continuing with the present reporting requirement and updating the reporting thresholds, if necessary.

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Request No. DTE-LDC 4-4

Please refer to Attachment A: Problem Circuit Remediation Index (PCRI).

- (a) Would this proposed penalty measure improve the performance of problem circuits?
- (b) What improvements could be made to the proposed program to enhance it?
- (c) Is there an alternative method of improving performance of poorly performing circuits?
- (d) The Department has allocated 45 percent of the potential penalty pool to SAIDI and SAIFI in Docket 99-84. If the Department was to approve the PCRI program, what percentage of the potential penalty pool should be allocated to PCRI?

Response:

Part a:

The proposed "Problem Circuit Remediation Index (PCRI)" will still have the inherent disadvantages as noted in response DTE-LDC 4-2 that come with reporting reliability on a circuit level basis. Being a composite index, PCRI does not directly relate to practical, real world performance. For instance, SAIDI is the length of time that the average customer is without power for a given time period. SAIFI is the number of interruptions that the average customer experiences in a year. PCRI is the length of time times the number of interruptions that the average customer experiences in a year. Additionally, there are a number of other issues that present themselves:

1. The proposed index is placing an abnormally high weighting on the number of interruptions that a customer experiences. PCRI can be broken down into the following:

$$\text{PCRI} = \frac{\text{SAIFI} * \text{SAIDI}}{\text{Average number of customers served}}$$

$$\text{PCRI} = \frac{\text{SAIFI} * (\text{SAIFI} * \text{CAIDI})}{\text{Average number of customers served}}$$

This index is double counting the impact of interruption. A project which decreases the probability of interruption will provide twice the benefit to the index as a project that may reduce the response time to restoring the outage. Utilities need the flexibility to implement the most cost effective projects targeting either a reduction in saved customer interruptions or reduced restoration time.

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2. As stated in response DTE-LDC 4-2, each circuit has its own design, customer density, location (rural or urban, trees or not), circuit ties, etc. From this standpoint, individual circuits cannot be compared with other circuits. Circuits can only be compared to their historical performance and even that comparison is difficult due to the potential for high variability.

A good example of the incomparability of circuits would be urban vs. rural designs. It is not economically practical for rural circuits to have the same reliability as urban circuits. Urban circuits are generally shorter, of underground construction and have circuit tie capability. Rural circuits are generally longer circuits, of overhead construction and generally do not have circuit tie capability. For a system that is a mixture of rural and urban circuits, this approach could result in expensive capital investment to develop enough circuit tie capability and reduce circuit exposure to enable rural circuits to perform as well as urban circuits.

3. It will be more difficult for Unitil to meet the requirements as proposed in this index because it includes a large percentage of the system. The top ten circuits for Unitil result in 20 percent of the entire circuit base where the top ten circuits for a larger company result in a much lower percentage. Also, improvements on these circuits will be more expensive on a cost per customer basis because Unitil would be attempting to implement reliability improvement projects on 20 percent of the system on an annual basis.

The proposed approach could result in a list of worst performing circuits that is similar from year to year. Note 2 of Attachment A indicates that no circuit will appear on the list of any consecutive classes. That means that if the PCRI index for Unitil's top ten worst circuits does not fall within one standard deviation of the deadband, additional circuits would be added to the list in subsequent years. For instance, if five circuits were repeat performers from one year to the next, the next five worst performing circuit would be chosen. That would result in the top 15 circuits over two years or 30 percent of the system. The worst case would be if both years resulted in the same top ten list, then 40 percent of the system would require some sort of reliability improvement project by year two. Perhaps considering the top x percent of worst performing circuits, or a representatively fair absolute sample would be more appropriate, instead of the companies' top ten.

4. Tracking reliability performance on circuits over several years is not a true indication of reliability on that circuit. Unitil uses circuit transfers to maximize system performance from a reliability standpoint while also deferring system improvement projects for loading or voltage concerns. Once the configuration of a circuit changes, the overall performance of the circuit will change and no longer

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can be compared to the historical performance standard. This approach will create a data set that is inconsistent over the timeframe proposed in the PCRI index.

5. It takes some time for utilities to realize the benefits of reliability improvements. For instance, Unitil will conduct its formal reliability review this fall to develop reliability improvement projects for consideration in the 2006 capital budget. By the time the budget is approved, materials are ordered and the project is constructed, it is the middle of 2006. The measured benefits of those improvements are not realized until an entire calendar year has passed (with respect to the index). Customers will experience the benefit immediately following project completion. This rotating process works well for improving reliability performance on a system basis, but will not necessarily work favorably with the proposed PCRI index approach.

For the variety of reasons stated above, Unitil's opinion is that the proposed PCRI index approach will not necessarily improve the performance of problem circuits.

Part b:

It appears that this program will tend to have a "snowball" effect depending upon the reliability performance of the circuits. As described above, if the same circuits perform poorly for two years in a row, Unitil will quickly be focusing on 40 percent of their system for reliability performance projects. One way to solve this problem is to allow a company to work on the set of worst performing circuits until they improve the reliability to within one standard deviation of the deadband and then create a new set of worst performing circuits. Another approach would be to use the top x percent of worst performing circuits, or a more representatively fair absolute sample, instead of the companies' top ten.

In addition, a one year timeframe is too short to implement and measure the benefits of reliability improvement projects. As described above, it can take as much as two years to realize the benefit of reliability improvement projects.

PCRI is not an adequate index because it places too much emphasis on eliminating interruptions as opposed to reducing the restoration duration of interruptions. The PCRI index is focused on circuit level performance. A circuit level approach using a circuit SAIDI (average of the top ten worst performing circuits) may work. These projects would be weighted evenly between their SAIFI and CAIDI component of SAIDI. This will allow the utilities to have the flexibility required to implement the most cost effective reliability improvement projects.

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Part c:

As described in DTE-LDC 4-2, Unitil supports the current poor performing circuit reporting requirement for the annual SQ filing. The current requirement is successful at identifying pockets of poor performance while minimizing the impact of year over year variability in the data. Unitil has generally been successful in identifying and implementing improvements on poor performing circuits.

The current reporting requirement looks at reliability performance over a two year period. Circuits within the two year period that 1) are among the top ten worst performers for those two years, or 2) have circuit level reliability indices that are 300 percent greater than the system average of all feeders are reported. The combination of worst performing circuits and 300 percent greater than the system average provide better information about pockets of poor performance than simply reporting the circuit level reliability indices. Unitil recommends continuing with the present reporting requirement and updating the reporting thresholds, if necessary.

Unitil's approach to reliability improvement on poor performing pockets of the system consists of researching the worst outages and the worst performing circuits on a routine basis. Trouble report information is analyzed to determine any trends to the causes of outages. Reliability improvement projects are developed and compared to each other based upon dollars per saved customer minute of outage time and dollars per saved customer interruption. The projects chosen have the highest relative benefit to cost ratio. This is consistent with the reporting that is required for the annual SQ filing.

Unitil is concerned with any penalty measures that occur from reporting reliability indices on a circuit level basis. As stated above and in other responses, reviewing reliability performance on a circuit level basis is a good analytical tool that can be used by utilities in conjunction with other system knowledge to develop cost effective system reliability improvement projects. However, the variability from year to year (i.e., weather, circuit configuration, trimming cycle, etc.) can have a major impact on the results. Utilities need to have the flexibility to implement reliability improvement projects that provide the best cost to benefit ratio.

Part d:

Unitil does not believe that PCRI as presented in Attachment A is an index that will promote improving performance of poor performing circuits. Therefore, Unitil does not recommend allocating any percentage to the PCRI index.

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Request No. DTE-LDC 4-5

Please refer to Attachment B: Major Safety Incident Index (MSII).

- (a) Is it feasible for the Department to substitute this new MSII penalty measure for its existing Lost Work Time Accident measure for Electric Distribution Companies?
- (b) What improvements could be made to the proposed program?
- (c) If the Department were to approve the MSII penalty measure, what percentage of the potential penalty pool should be allocated to the MSII measure?

Response:

- (a) Unitil does not recommend that the Department substitute the proposed MSII measure for its existing Lost Work Time Accident measure. It is questionable whether the accumulation and reporting of the requested data will yield sufficient relevant information concerning the performance of the distribution company upon which a meaningful benchmark may be calculated. The definition of a Major Safety Incident appears to be too broad a measure upon which to accurately gauge safety performance, and its use in the calculation of a performance benchmark may penalize the distribution company for events not within the company's control.
- (b) Unitil does not object to collecting the data, but does not believe that the data should be employed as part of a performance measure. There needs to be further evaluation as to whether the incidents which the measure would tally are within the control of the distribution company; whether the accumulation of this data would yield results from which meaningful conclusions may be drawn concerning a company's behavior; and whether a monetary penalty applied to this benchmark would influence such behavior in a positive manner and without unintended negative effects.
- (c) See response to (b), above.

Person Responsible: Chris Dube

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Request No. DTE-LDC 4-6

Do the Companies have any alternative penalty measures that would accomplish the goals of PCRI and MSII? Describe.

Response:

Unitil supports the current poor performing circuit reporting requirement for the annual SQ filing. The current requirement is successful at identifying pockets of poor performance while minimizing the impact of year over year variability in the data. At this time, Unitil does not have any indication that alternative penalty measures would produce better results than the existing approach.

Person Responsible: Kevin Sprague

Date: July 13, 2005